HAWAIYA TECHNOLOGIES, LLC

a Small Minority & Veteran Owned Business

Hawaii Homeland Security Command Information System (H2S CIS)

FINAL REPORT

Prepared for:

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H2S CIS FINAL REPORT

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1. Barriers to technology-to-technology integration and insertion and to information sharing and integration addressed by the project.

A. Statement of the problem addressed by the pilot.

Hawaii is unique among all the states in that there is a particularly challenging problem in the protection of ports and critical infrastructure because of its dispersed islands and unprotected borders. It is the only island state with seven principal islands surrounded on all sides by international borders, ocean, and hundreds of miles of rugged coastline. Additionally, there is a significant military presence along with multiple federal agencies which pose daunting interoperability challenges for the security of Hawaii.

Currently, the State of Hawaii has no coastal surveillance systems nor ANY port or port approach surveillance capability, visual or radar. While the Navy provides surveillance of Pearl Harbor and the Air Force and FCC have approach radars for Honolulu International Airport, there exists no other surveillance coverage for any other ports, borders or of the international sea lanes approaching the state. The state's critical infrastructure (e.g., Hawaiian Electric Company, Water and Sewage systems, ports, hospitals and shopping malls) have continued to improve their individual surveillance and protection systems, but no means exists to provide any coordinated or centralized monitoring at a county or state level. Therefore, protection of tourism, security of trans-shipments through the port of Honolulu, and counter-terrorism, create a need for an interoperable and robust surveillance, and command and control (C2) capability that can tie various DHS, DOD, and first responder local agencies in the event of a natural or man-made disaster.

In Aug 2002, a GAO report "PORT SECURITY Nation Faces Formidable Challenges in Making New Initiatives Successful" stated that: Seaport security is a complex issue that involves numerous key actors including federal, state and local law enforcement and inspection agencies; port authorities; private businesses; and organized labor and other port employees; seaport security concerns are complicated by the sometimes conflicting views of the many stakeholders that are involved in port decisions, including government agencies at the federal, state and local levels and thousands of private sector companies.

The report also found that seaports are inherently vulnerable to terrorist attacks because of their size, generally open accessibility by water and land, location in metropolitan areas, the amount of material being transported through ports and the ready transportation links to other locations inside the U.S. It is important to recognize that 95% of non-North American foreign trade arrives by ship that includes 5400 ships / 60,000 port visits in 2001 and growing every year.

In addition to the vulnerability of our ports, the Department of Homeland Security's Infrastructure Protection (IP) Division has accelerated its program to identify

our nation's critical infrastructure and provide a means to develop anti-terrorist defensive measures to protect the individual ports, facilities and other state critical infrastructure. To facilitate this effort, DHS IP has implemented its Buffer Zone Protection Plan (BZPP) program. This program is designed to identify vulnerabilities and provide means and plans to mitigate them. The State of Hawaii has aggressively identified its critical infrastructure but has not yet been able implement a BZPP Program. The State Civil Defense Team has recognized a clear shortfall in harbor surveillance as well as a coordinated surveillance programs for the rest of the state's critical infrastructure. The Hawaiian Homeland Security Command Information System (H2S-CIS) project will begin to address this significant shortfall in Hawaiian Homeland Security.

B. Circumstances giving rise to the existence of the barriers that are retarding the flow of information in the interest of improved homeland security and how the project will mitigate those barriers.

Currently, the State of Hawaii has no coastal surveillance systems nor ANY port or port approach surveillance capability, visual or radar. Without a capability to provide surveillance input, centralized monitoring, as well as wide area command and control the state is inadequately prepared to efficiently and effectively provide a rapid response to either concentrated, large area, natural or manmade disasters. To exacerbate this lack of capability, the Hawaiian Island chain spans some 1000 miles and its position as the first port of entry into the U.S. from the Asia-Pacific region allows it be a first stop for illegal entry and activity without even a rudimentary means to identify or monitor this sort of activity.

The H2S CIS project demonstrated that desperate surveillance data could be gathered and fused into information displayed for command and control decision support. The project also demonstrated that the State of Hawaii can implement this system island wide to provide adequate homeland security surveillance of its ports and harbors.

C. The types of barriers – technological, organizational, cultural, etc.

1. Technical barriers included:

   - Data conversion
     - Radar to IP
     - Camera to IP
     - AIS to IP
   - Proprietary vendor software that was difficult to integrate into the H2S CIS application.
   - Proprietary vendor software that was incompatible with state intranet security protocols.
   - Bandwidth on state intranet was limited driving a decrease in video resolution to be able to have both camera and radar sending data feeds simultaneously.

- Dependency of surveillance sensor installation site on network availability limiting optimal placement of sensors.
- Existing network infrastructure at installation site was limited and needed to be upgraded to gain connectivity to state intranet.
- Designing a mounting system that is sturdy, weatherproof, not mounted to the roof and provided optimal range and visibility for the camera, AIS antenna and radar.
- Device connectivity and cabling issues.

2. Organizational issues included:

- Hawaii State Civil Defense (SCD) establishing jurisdiction to implement surveillance system.
- State inter agency cooperation (SCD/Harbors/Public Safety/USCG) was required to gain permission to install the sensors and to discuss how to share the information.
- The desire to integrate additional functionality and capacity into original system without incurring additional expense.
- The Critical Infrastructure, Hawaii Electric Company (HECO) had no precedence for sharing their surveillance video feed so needed to establish protocols and operating procedures.
- HECO needed to address liability issues specific to opening their surveillance video feed to SCD.
- Obtaining rights to government owned software to use in building the H2S CIS was time consuming and difficult if not impossible.
- Grant format was unfamiliar to state purchasing agency causing stop payment to vendor in mid grant.
- Getting regular access to installation site due to scheduling conflicts with building occupants.
- Some trepidation by agency personnel in respect to RADHAZ from radar.

2. The approach used to overcome these barriers.

A. Statement of the program plan for conducting the pilot.

The H2S CIS is an intranet-based command, control and surveillance system, which allows for the integration of widely dispersed, disparate sensors (including both electro-optical and radar with a potential for the future incorporation of chemical and biological sensor data) and displays the sensor data in a Command Center/Emergency Operating Center. The system also has demonstrated an on-site mobile meshed wireless network with the capability to transmit voice over IP, data and images back to the EOC. We developed a port and critical infrastructure security surveillance capability for the State of Hawaii through a series of demonstrations tailored to Hawaii Homeland Security. Specifically, we provided an integrated radar and camera surveillance capability of representative critical infrastructure as objective

areas and provided a command and control (C2) capability at the Hawaii Civil Defense Emergency Operating Center (EOC) located within Diamond Head Crater. Because SCD has chosen to use the State Intranet (rather than the Internet) as the conduit for the images and data, the displaying of the data and images can be accessed by remote users with access to the State Intranet and who have appropriate permission.

B. Description of the steps that were taken to address the barriers.

1. Technical barriers

- Data conversion

  Data conversion for the radar proprietary software to IP formats was achieved by working directly with the radar vendor software support teams to make adjustments to the code or implement solutions on how to bypass the barriers.

  The camera images needed to be paired with a DVR that was compatible with the camera software language in order to manage, capture and record the images from the Pelco camera and translate them through the network to the command display station.

  A converter box was purchased to translate the AIS data from serial to TCP/IP.

- Proprietary vendor software that was difficult to integrate into the H2S CIS application.

  This was achieved in some cases by rewriting the code for the software to enable "hooks" into the proprietary software for the H2S CIS application.

- Proprietary vendor software that was incompatible with state intranet security protocols.

  The radar software in particular sent packets through the network via a UPD Broadcast mechanism. The vendor provided a patch to their software to circumvent this procedure.

- Bandwidth on state intranet was limited driving a decrease in video resolution to be able to have both camera and radar sending data feeds simultaneously.

  A T1 line and drops needed to be installed in the sensor site building which involved scheduling and interagency cooperation between Hawaii State Civil Defense ("owner" of H2S CIS), Hawaii State Department of Accounting, IT Division (responsible party for all state networks) and Hawaii

Department of Public Safety ("owner" of building where sensors are installed).

- Dependency of surveillance sensor installation site on network availability limiting optimal placement of sensors.

  The effect of this was that the radar and camera were installed on the roof of a seven story building overlooking the harbor to be surveilled because this particular building had some existing network infrastructure enabling the data to be sent back to the EOC. This installation was not optimal because the type of radar installed (based on cost and ease of use) is a marine system designed to be installed on a vessel more or less at sea level. Therefore the angle of radar in looking down at the vessels was not optimal in capturing clear images. Adjustments had to be made in the radar to maximize visibility and angle while giving some concession to capability driven by the angle of the roof install.

- Existing network infrastructure at installation site was limited and needed to be upgraded to gain connectivity to state intranet.

  A T1 line and drops needed to be installed in the sensor site building which involved scheduling and interagency cooperation between Hawaii State Civil Defense ("owner" of H2S CIS), Hawaii State Department of Accounting, IT Division (responsible party for all state networks) and Hawaii Department of Public Safety ("owner" of building where sensors are installed).

- Designing a mounting system that is sturdy, weatherproof, non-invasive to the roof and provided optimal range and visibility for the camera, AIS antenna and radar.

  The radar and AIS antennae were both designed to be mounted on a vessel. The camera is a pan tilt zoom that normally is either ceiling or wall mounted. The mounting structure was to be installed on a roof, freestanding, temporary, located on the ocean's edge and therefore subject to extreme weather conditions, including wind, sun, rain and corrosion. We designed and had custom built a mounting system that was constructed of heavy duty pipe with padding on the bottom that could accommodate the three sensors and meet the weather conditions and still be unfixed to the roof infrastructure.

- Device connectivity and cabling issues.

  There were several challenges in physically connecting the various sensors to the mount and to the nearest network drop located approximately 100 feet from the mount. This involved a specialized design, long lengths of cable, connector adapters, weather proofing of cabling and connector items.

2. Organizational issues included:

   - Hawaii State Civil Defense (SCD) establishing jurisdiction to implement surveillance system. State inter agency cooperation (SCD/Harbors/Public Safety/USCG) was required to gain permission to install the sensors and to discuss how to share the information.

     Initially it was necessary for SCD to work with other agencies to enable the awareness of H2S CIS and consent that SCD had jurisdiction to implement the system. This was both specific to the physical installation of the sensors on a state building that was not under their jurisdiction and the transmitting of the data over the State intranet. It was observed that because this project was under the auspices of Homeland Security and for the purpose of providing a demonstration of how Hawaii's ports and harbors could be better protected, cooperation was unprecedented among the various agencies when approached. This also drove agencies such as the State Department of Transportation, Harbors Division, State Law Enforcement Committee and State Information and Communication Services Division to all express interest in the ability to also receive the data feed to their respective sites to improve their security requirements.

   - The desire to integrate additional functionality and capacity into original system without incurring additional expense.

     It was the goal of Hawaiya Technologies, LLC and SCD to attempt to integrated functionality beyond the scope of the original deliverables while working within the grant funding. Initially the scope called for one sensor (camera) and to address the inclusion of several other types of sensors into the demonstration would significantly enhance the surveillance capability and potential of the project. This was achieved by balancing cost of originally specified hardware against the ability to purchase additional sensors. We were able to add both radar and AIS sensors to the H2S CIS and demonstrate an on-scene mobile meshed wireless capability by using this approach and therefore meeting our goal.

     As a result we were able to add the following sensors and functionality:

     Radar
     Automatic Information System
     California Integrated Seismic Network
     Critical Infrastructure Video Surveillance Feed

   - The Critical Infrastructure (HECO) had no precedence for sharing their surveillance video feed so needed to establish protocols and operating

procedures and also needed to address liability issues specific to opening their surveillance video feed to SCD.

HECO was cooperative in their desire to open their surveillance feed under specific circumstances to the H2S CIS for viewing at the SCD EOC. However having no precedence for sharing this information outside of their organization and being concerned about both company proprietary issues and liability there was requirement that HECO establish standard operating procedures to define how, when and at what level this data would be shared. Because HECO is a public utility they were also concerned with PUC requirements specific to this issue. At the time of this report they are still working internally to define and resolve these issues.

- Obtaining rights to government owned software to use in building the H2S CIS was time consuming and difficult if not impossible.

  This barrier actually caused the renaming of the system. We had assumed that we would have access to software entitled Common Situation Display System (CSDS) that was developed by the USCG using a private sector contractor. It was the intent to use this software as the foundation of the H2S CIS system. Various factors contributed to the difficulty in getting the software. These included a claim by the private sector contractor that they retained certain rights to the software and the USCG uncertainty as to the validity of that claim. And if in fact the contractor had such rights we needed to get a ruling from DHS as to the intellectual property rights of the final H2S CIS product because the vendor was claiming they would have some rights to the H2S CIS if their software was used in part to construct the H2S CIS product. All of these issues resulted in a significant delay in starting the development of the system software which ultimately resulted in the decision that we would write the software from "scratch" which was done quite successfully. This is the reason that the system name was changed from Hawaii Homeland Security Common Situation Display System (H2S CSDS) to Hawaii Homeland Security Command Information System (H2S CIS).

- Grant format was unfamiliar to state purchasing agency causing stop payment to vendor in mid grant.

  Midway into the grant period, the Hawaii State Department of Accounting (DAGS) took issue with the fact that this grant was not solicited by Hawaii State Civil Defense to select a vendor. Repeated written and verbal communication by both the Hawaii Attorney General's office and the Department of Homeland Security to explain the grant was solicited by DHS and awarded jointly to Hawaii Civil Defense and Hawaiya Technologies, LLC has not mitigated this situation. This has

resulted in no funds being released by DAGS against any of the invoices submitted as of May 2005 by Hawaiya Technologies, LLC for services rendered under the grant. It should be noted that invoices prior to that date were paid by DAGS.

- Getting regular access to installation site due to scheduling conflicts with building occupants.

  The installation of the sensors on the roof and the wiring and device cabinet located in a nearby conference room predicated that the project work at that site be coordinated and scheduled to accommodate use of the conference room. Ideally the installation would be in an area where no conflicts with building occupants would occur so easy and open access to such would be available at all times.

3. Accomplishments, lessons learned and benefits.

A. Description of the results in the context of accomplishments, lessons learned, and benefits.

1. Accomplishments

- Integration of various vendor proprietary software into H2S CIS
- Integration of various vendor proprietary software into IP environment
- Customization of radar software to target objects
- Creation of alerting capability
- Design for system to work over VPN
- Implementation of additional sensors and functionality outside original scope of deliverables.

2. Lessons learned

- Can add additional deliverables/functionality without increasing costs
- DHS needs to define IP rights to final grant software product in initial grant solicitation.
- Need some type of maritime interagency security committee comprised of relevant state, federal and local representatives to define port security requirements, process and procedures to implement, manage and react.
- Sharing of critical infrastructure data requires policies to be in place to establish protocols and address liability issues.
- Access to government owned software is restrictive and difficult (need better interagency cooperation as this could significantly cut development curve, costs and time)
- Proprietary vendor software for sensors can be difficult to fuse together and into IP environment.

- Proprietary vendor software for sensors may have security conflict with government network security policies.
- Type of radar and camera (driven by budget) constricts images available.
- Adapting surveillance devices for land based mounting can be difficult and costly
- Structure of grant award (jointly to State and HT) caused confusion resulting in delayed payments by State procurement.

3. Benefits

- Project implemented a real time surveillance capability for a port where none previously existed.
- Unprecedented interagency cooperation at federal, state and local levels.
- Unprecedented cooperation between a critical infrastructure and a state agency.
- Project drove the installation of additional communication infrastructure between facilities and State and HECO
- Increased awareness and need for port security resulting in probable add on to project through other State funding sources.

B. How the approach for removing the barriers directly contributed to the outcomes.

The agencies working together on the H2S CIS were excited and committed to making the project a success because of the Homeland Security benefits to all of the State of Hawaii. Capitalizing on this attitude enabled an unprecedented level of cooperation which in turn smoothed the way for implementation.

Additionally we found that even the sensor vendors were more willing to work with us in designing work-arounds for their software in integrating into the H2S CIS.

The approach to conscript all the players involved based on the assumption that the project was for the good of all seemed to pave the way for a very successful pilot that delivered more than specified, was on budget and on time.

C. Recommendations for how the results might best be duplicated.

The H2S CIS project has been thoroughly documented in both the H2S CIS Project Management Plan (PMP v.3) and Hardware/Software Architecture Document (HADD). Both of these documents are available from Hawaii State Civil Defense.

D. Modifications to the approach that would have likely contributed to better results.

The H2s CIS team made the assumption that they would have access to government owned software that could have served as the foundation for the H2S CIS program. This approach was not successful due to a variety of reasons but primarily

because of unclear intellectual property rights of the government versus the contractor who was paid to produce the software.

4. Metrics used to measure project accomplishments

A. The metrics that quantify the accomplishments and provide the measurements of the pilot's success.

1. Metric: Dynamic Mission Operation and Replanning of Hawaii Coastal Surveillance

- Demonstrate ability of an operator to redirect maritime surveillance mission in less than 10 minutes average time with only limited, high-level operator input following identification of a new target or stationary threat, a change in the priority of a target, a change in weather, or a detected sensor failure.

Accomplished by:

Incorporating a rating system in the tracking software that alerts the operator as to the threat level of a newly occurring incident.

2. Metric: Human Interface of H2S-CIS Infrastructure

- Demonstrate intelligent operator alerting to draw the operator's attention to important tactical information immediately of threat identification without adding additional personnel to the current Hawaii Civil Defense Staffing levels.

Accomplished by:

Incorporating audible signals as well as color coded messages and icons into the user interface. These graphical user interface (GUI) techniques provide both immediate and persistent feedback in a dynamic situation.

3. Metric: Ease of Operation

- Demonstrate the ability of a minimally trained operator to man the H2S-CIS system autonomously for the duration of the operation

Accomplished by:

Providing user guides and training to the SCD staff.

5. Innovative uses of existing "state-of-the-market" information technology

A. The role played by information technology.

See the H2S CIS HADD for technical specifications and descriptions of all hardware and software used.

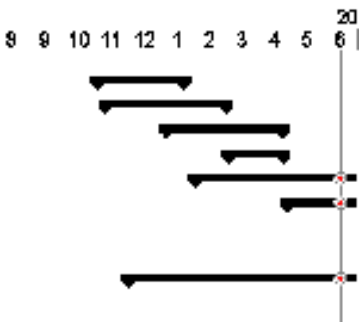
6. Actual costs of the project and a schedule showing planned milestones versus the actual results achieved

A. A comparison between actual and planned costs

Category	Budgeted	Actual
Labor	$250,346.00	$340,160.64
Travel	$3,193.00	$0.00
Equipment	$55,400.00	$48,798.88
Supplies	$1,450.00	$0.00
Anteon	$95,000.00	$27,239.54
Other	$10,815.00	$0.00
Totals	$416,204.00	$416,199.06

B. A comparison between and actual and planned milestones over the duration of the project.

ID	Task Name	Start	Finish
1	ODP Grant Initiation	Mon 8/2/04	Fri 10/22/04
2	System Requirements Analysis	Tue 11/2/04	Fri 1/21/05
18	System Design	Wed 11/10/04	Mon 2/28/05
34	Equipment Procurement	Wed 1/5/05	Fri 4/22/05
52	Identify Potential Add Ons	Fri 3/4/05	Fri 4/22/05
55	System Benchmarking	Tue 2/1/05	Fri 7/15/05
58	System Implementation	Wed 4/27/05	Fri 8/5/05
70	System Test and Evaluation	Tue 7/5/05	Fri 8/5/05
84	System Operations	Mon 7/25/05	Fri 8/5/05
88	Advanced Concept Study	Wed 12/1/04	Fri 8/19/05
92	Final Report	Mon 8/1/05	Fri 9/30/05



All deliveries were made on-time as planned. Hawaiya Technologies, LLC delivered additional capabilities to the H2S CIS system than what was contracted and under budget.

7. The involvement of public safety communities, governmental jurisdictions and the private sector in the project.

A. The organizations in the above categories that participated in the pilot.

- Hawaii State Civil Defense (SCD)
- Hawaii State Department of Public Safety (DPS)
- Hawaii State Department of Transportation, Harbors Division

- Hawaii Electric Company (HECO)
- Hawaii State Department of Accounting, Information Communications Systems Division (DAGS, ICSD)
- Hawaii State Law Enforcement Coalition
- Hawaii State Department of the Attorney General
- Hawaii Army National Guard
- Hawaii Emergency Preparedness Executive Committee
- Committee United States Geological Survey (USGS)
- United States Coast Guard (USCG, Honolulu Det)

B. The interrelationship between these organizations.

- SCD worked with DPS to gain access to the building where the radar, camera and AIS sensors were installed.
- SCD worked with the USCG and State Harbors Division to understand the surveillance requirements, targets and situation for the small boat harbor that was being surveilled and to define additional ports and harbors where the H2S CIS could be installed in the future.
- SCD worked with HECO, the designated critical infrastructure, to obtain their video surveillance feed into the H2S CIS.
- SCD worked with DAGS, ICSD to install both additional and new network infrastructure between the sensor building and HECO.
- SCD worked with USCG to get the California Integrated Seismic Network system link installed on the H2S CIS Display station.
- SCD worked with State Attorney General's office to provide clarification on grant status to DAGS in attempt to justify non-solicitation of grant and get payment instituted to Hawaiya Technologies, LLC.

8. Steps and procedures required for other organizations to replicate the project's accomplishments.

A. Form an interagency committee from State and local Homeland Defense, Law Enforcement, Maritime agencies and any other organizations that may have vested interest in utilizing a sensor and internet based surveillance system to:

- Identify and define the need for a system
- Identify primary "owner" of system
- Perform a needs assessment including identification and justification of users
- Look at existing capabilities to integrate into system
- Identify type, location of sensors and methodology to transmit data to centralized point for command and control decision making
- Estimate cost of system
- Identify potential funding for project including DHS Ports Security Grants and local funding.
- Discuss strategies on how to implement the system
- Use existing H2S CIS technical and project documentation to implement.

9. Recommendations for transitioning the project to an ongoing program

An Advanced Concept Study was performed as a deliverable to this project. It identified and defined three areas where the H2S CIS project could be transitioned. Those areas studied were:

- Advanced Sensor Integration
- Mission Planning System Integration
- Operator Collaboration Tools Integration

It is recommended that the project transition to an ongoing program that not only incorporates the technologies and tools identified in the study but that scales to include all small ports and harbors in the Hawaiian Island chain. To do this the project must receive additional funding which is being sourced through grant application at the Federal, State and local levels. There is a high level of interest on the part of all three of these entities to increase the not only the scalability of H2S CIS but the scope of capability by adding additional sensors, mission planning capability and operator collaboration tools.

10. Description of the value and benefits of the project to the National Strategy for Homeland Security

A. The strategic objectives of homeland security in order of priority are to:

- Prevent terrorist attacks within the United States;
- Reduce America's vulnerability to terrorism; and
- Minimize the damage and recover from attacks that do occur.

The H2S CIS meets all three of these objectives by:

- Preventing terrorist attacks within the United States.

  The H2S CIS project implemented the only existing disparate sensor port surveillance capability in the State of Hawaii with the intent of observing foreign vessel and crew movement into and out of the State.

- Reduce America's vulnerability to terrorism

  The H2S CIS project reduces the vulnerability of the State of Hawaii to terrorism by providing a port surveillance system that observes the movement of foreign fishing vessels in and out of the primary port used by these vessels on Oahu. Additionally the system implemented a video surveillance data feed from a critical infrastructure to SCD's EOC which reduces the vulnerability of the critical infrastructure to terrorism.

- Minimize the damage and recover from attacks that do occur.

  Using data from the H2S CIS system, operators at SCD could observe suspicious behaviors and proactively alert the proper federal and state authorities to potential attacks which could minimize the damage from such an attack. In the event of an attack on a critical infrastructure, the system could observe, record and identify areas that have been damaged to better assist in recovery efforts. This applies to both the data feed and the on-scene wireless capability.

  The H2S CIS system could be potentially tied into a nationwide sensor surveillance network such as the Homeland Security Information Network or become part of the Urban Areas Security Initiative which has

B. How this project contributes to the overall DHS mission nationwide in regard to information sharing, wireless, or geospatial technologies.

The H2S CIS project incorporates all three of the DHS mission objectives specific to information sharing, wireless and geospatial technologies.

- Information Sharing Technology

The data transmitted from the sensors over the Hawaii State Intranet can be accessed remotely and shared by authorized users. This includes any agency with Hawaii State intranet access. Additionally as the system grows and incorporates more sensors and greater geographical areas, the interest and demand to share this information will increase exponentially among those entities.

- Wireless Technology

H2S CIS demonstrated an on-scene mobile, meshed wireless network with data, voice and image transmission capability that can be used in a stand alone mode for on site rapid incident response and reporting or tied via reach back to the internet for transmission to a command center.

- Geospatial Technology

H2S CIS uses geographical and spatial data to identify activity in a specific area of interest to Homeland Security, e.g. seaport with foreign vessel and crew activity and site specific image surveillance from a critical infrastructure that could provide command and control capability during a perceived terrorist incident.

11. Key participants in the project.

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